Ultrasound imaging for the rheumatologist XXXVIII. Sonographic assessment of the hip in psoriatic arthritis patients

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ABSTRACT

Objectives. The aims of our study were to investigate the prevalence of ultrasound (US) pathological abnormalities in the hip of psoriatic arthritis (PsA) patients and compare them with the clinical findings.

Methods. *Sixty-five PsA patients were enrolled in the study. Bilateral examination of the hip was performed to detect joint effusion, synovial hypertrophy, irregularity of femoral head and neck profile as seen in erosions and/or osteophytes.*

Results. *Joint effusion was detected in 20 out of 130 hips (15%). Synovial hypertrophy was present in 12 out of 20 hips (60%) associated with effusion (9.3% of all hip joints) and only 1 of them showed PD signal. Small effusion without synovial proliferation was imaged in 8 out of 20 hips (40%). On the whole 14 out of 65 patients (21%) had joint effusion with or without synovial hypertrophy using US. No erosions of the femoral head and neck profile were detected whilst osteophytes were imaged in 27 joints (20%). No US abnormalities were demonstrated in 18 hips with pain/tenderness on physical examination, whilst joint effusion was seen in 8 joints which were asymptomatic.*

Conclusions. *US is a useful imaging method to evaluate hip involvement in PsA that could be integrated into routine PsA management even if patients do not complain of hip involvement.*

Introduction

Psoriatic arthritis (PsA) is a chronic inflammatory joint disease associated with psoriasis and classified among the spondyloarthropathies, a family of related disorders linked by common genetics (HLA-B27) and common pathology (enthesitis) (1). Ankylosing spondylitis (AS) is the prototype of the spondyloarthropathies and hip involvement is one of the features and a major marker for disease severity (2). However, little is known about the prevalence and the outcome of hip joint involvement in PsA (3).

Ultrasound (US) is a useful technique for the examination of joint disorders to detect joint effusion, synovitis, tendon pathology and to image bone erosion with greater sensitivity than standard x-ray (4-7). It is being increasingly used in rheumatological practice and it is frequently employed in the routine examination of hips (8).

However, to the best of our knowledge, no study has reported data on the prevalence and the features of hip arthropathy in PsA evaluated by US.

The aims of our study were to investigate the prevalence of US detected abnormalities in the hips of PsA patients and to compare them with the clinical findings.

Patients and methods

This multi-centre study involved 4 Italian Rheumatology Units (Rheumatology Unit of University of Pisa, Università Politecnica delle Marche, University of Pavia, the Sapienza University of Rome) and the Rheumatology Department of Antrim Hospital, Northern Ireland, UK. US examinations, including grey-scale and power Doppler examinations, were carried out using a Logiq 9 machine (General Electrics Medical Systems, Milwaukee, WI) with a linear probe operating at 9 MHz by a rheumatologist who was well experienced in musculoskeletal US and blind to both

the clinical and laboratory data of the patients. Before the start of the study, all the sonographers reached an agreement on both the scanning technique and the definition of the pathological findings of interest. The study was performed according to the Declaration of Helsinki and local regulations and informed consent was obtained from all patients.

Patients

Sixty-five PsA patients attending the out-patient and the in-patient clinics of the Rheumatology Units involved were consecutively enrolled in the study. PsA was diagnosed according to the CASPAR criteria (9). In accordance with Moll and Wright subtypes, 53 patients showed peripheral joint involvement (28 oligoarticular ad 25 polyarticular), 12 axial involvement (in 2 patients axial and peripheral involvement were associated) (10). Thirty-five patients were treated with DMARDs (24 with methotrexate, 4 with sulphasalazine, 2 with sulphasalazine plus cyclosporine A and 3 with leflunomide), 23 with anti-TNF-alpha inhibitors (in 12 associated to DMARDs), 20 were taking steroids and 22 non-steroidal anti-inflammatory drugs. Patients who had a diagnosis of hip dysplasia or had been subjected to surgical treatment of the hip or received corticosteroid or hyaluronic acid injection into the hip, within the previous 3 months, were excluded. Demographic and clinical characteristics of the study patients are reported in Table I.

Clinical assessment

Prior to US assessment all patients were evaluated by a rheumatologist (not involved in US examination) for the presence/absence of pain, tenderness and joint mobility, according to standard techniques (11).

The patients were also assessed for history of hip pain and laboratory test abnormalities (elevation of ESR and C-reactive protein, presence or absence of rheumatoid factor and antibodies to anti citrullinated peptides). Current medical therapies were recorded and the BASDAI and BASFI questionnaires were completed for every patient.

In total 130 hip joints of 65 patients were studied.

US scanning technique

According to EULAR guidelines for musculoskeletal US in rheumatology, bilateral examination of the hip was performed with the patient supine and the hip in neutral position (12). Oblique longitudinal plane over the femoral neck to examine the anterior synovial recess, using the femoral head as a landmark, and transverse scan were adopted to detect joint effusion, synovial hypertrophy, irregularity of the femoral head and neck profile for erosions and/or osteophytes. When synovial hypertrophy was detected, power Doppler examination was performed and the following settings used: PRF 500 Hz, Doppler frequency 7.5 MHz and Doppler gain to avoid random noise visualisation.

US image interpretation

Joint effusion, synovial hypertrophy and bone erosion of the femur and/or acetabulum were defined according to the Outcome Measures in Rheumatoid Arthritis Clinical Trials (OMERACT) definitions (13). The limit for normal hip dimension was defined according to Koski *et al*. with values of ≥7 millimetre and a difference between hips of 1 or more millimetres was considered suggestive of intracapsular effusion (14).

Statistical analysis

Descriptive results are reported as mean and standard deviation (SD) according to their distribution. The student *t*-test was chosen to compare quantitative parameters in large samples of similar variance. Categorical variables were analysed using chi-squared tests. The findings were expressed as mean and standard deviation from the mean. Values of $p<0.05$ were considered to be statistically significant.

Table I. Main characteristics of patients with psoriatic arthritis.

Number of patients	M/F	Age (years) mean±SD (range)	Disease duration (months) mean±SD (range)
65	37/28	53 ± 12.83 years (87–16)	106 ± 101 months (528–7)

M/F: male/female ratio; SD: standard deviation.

Results

Using US, joint effusion was detected in 20 out of 130 hips (15%). Synovial hypertrophy was present in 12 out of 20 hips (60%) associated with effusion (9.3% of all hips) and only 1 out of them showed PD signal. Small effusion without synovial hypertrophy was imaged in 8 out of 20 hips (40%). On the whole, 14 out of 65 patients (21%) had joint effusion with or without synovial proliferation (in 6 patients joint effusion was bilateral and in 8 unilateral) (Fig. 1). No erosions of the femoral head and neck profile were detected in any joint, whilst osteophytes were imaged in 27 joints (20%). We observed a difference in disease duration (140 *vs*. 95 months) and in BASDAI score (7.75 *vs*. 4.8) between patients who showed osteophytes and patients with no osteophytes at US examination. Such a difference was not statistically significant.

Joint effusion was imaged in 8 hips which were asymptomatic, whilst no US abnormalities were detected in 18 joints which were painful upon clinical examination.

Patients with US-detected hip involvement did not differ significantly in terms of gender, age, disease duration, BASDAI and BASFI scores from patients with normal US findings. ESR and CRP were higher in the group with hip synovitis.

When we considered PsA subtypes, we observed hip involvement in 6 patients with polyarticular arthritis (one of such patients had axial and peripheral involvement), in 7 with oligoarticular arthritis, in 1 with psoriatic spondylitis alone. No statistical difference was observed in the prevalence of hip involvement in the different PsA subtypes.

At the time of the US examination, 22 (34%) patients complained of hip pain

and/or physical examination elicited tenderness (for a total of 30 joints). Hip pain and/or tenderness were reported by 30 (46%) subjects (for a total of 47 joints).

The pathological findings detected by US examination are reported in Table II. Table III illustrates the relationship between US and clinical findings indicative of hip joint inflammation. The agreement between clinical and US findings was indeed low, with non-significant concordance on positive or negative findings.

Discussion

Although spondyloarthropathies have different symptoms and outcomes, similar clinical features are common to AS, PsA, reactive arthritis, spondyloarthritis associated with inflammatory bowel disease and undifferentiated spondyloarthritis. Indeed, inflammatory back pain due to sacroiliitis, inflammation at other locations in the axial skeleton, enthesitis and peripheral arthritis are common manifestations of the disorders in this spectrum (15).

Hip involvement is a common and disabling problem in AS patients and it often carries a more severe prognosis. A very recent study of 56 patients affected by AS reported that one third of patients complained of symptoms that were compatible with joint inflammation and US abnormalities were demonstrated in a similar proportion of subjects (16). The prevalence of hip involvement in PsA has been the topic of very few investigations. To the best of our knowledge, only one study of hip involvement in PsA is reported in the international literature (3). Michet *et al*. performed a prospective analysis of PsA hip disease in a cohort of 504 patients evaluated by subsequent clinic visits and chart and radiographic review. The Authors concluded that arthropathy occurs infrequently in PsA *i.e*. only in <7% of patients followed up for a median of 5 years.

Plain radiographs have traditionally been used to detect and estimate the extent of joint damage. However, it is well known that US imaging can lead to earlier detection of joint damage than plain radiographs and is also a sensitive means of assessing inflammation (17). The availability of sensitive and accurate tools for evaluating disease severity is fundamental to enable appropriate treatment planning in PsA.

Using US, we imaged 130 hips of PsA patients and identified joint effusion with or without synovial proliferation in 14 out of 65 patients (21%), lower than that reported in AS (21% *vs*. 37.5%) (16). It is interesting to observe the different results provided by clinical examination and US assessment. No US abnormalities were detected in 18 hips with pain/tenderness at physical examination whilst joint effusion was imaged in 8 joints which were entirely asymptomatic. Given the sensitivity and the specificity of the two studies previously published for other joints (7, 18), we speculate that clinical examination is non-specific and is affected by

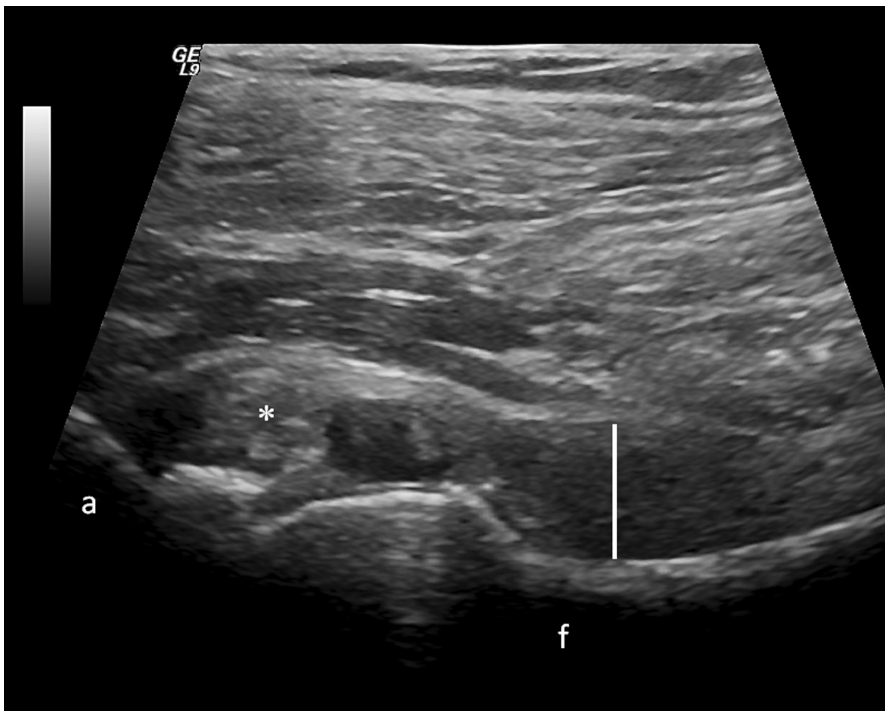

Fig. 1. Proliferative synovitis of the hip. Longitudinal anterior view shows marked joint cavity widening (distance between femoral neck and ileopsoas fascia equal to 11.1 mm) with evident sign of synovial proliferation (*). Intra-articular abnormal amount of synovial fluid enhances the chondro-synovial margin visualisation where ultrasound beam direction is perpendicular to the femoral cartilage surface. **a**: acetabulum; **f**: femur.

Table II. Pathological findings detected by US examination of the hip in psoriatic arthritis patients

US findings	Involved hip n. (%)	Patients n. (%)
Joint effusion	20/130 (15%)	14/65 (21%)
Synovial hypertrophy	12/20 (60%)	7/65 (10%)
Intra-articular power Doppler	1/130 (0.7%)	1/65 (1.5%)
Bone erosions	0/130 (0%)	0/65 (0%)

Table III. Relationship between US and clinical findings indicative of hip joint inflammation.

		Clinical findings		
US findings		Presence	Absence	Total
Hip joint inflammation	Presence	12	8	20
	Absence	18	102	110

several confounders, mostly the presence of osteoarthritis, but also tendon and periarticular involvement (better visualised by US).

In our study, intra-articular PD signal was found in only 1 out of 130 joints which is low. We have seen similar results in previous studies looking at knee involvement in PsA and RA patients, since the greater the interface between the probe and the joint, the less chance there is of detecting PD signal (7, 18).

No erosions were detected in any hip joint evaluated. Again this data recalls the observations obtained by US examinations of the knee in PsA and RA patients. As for the knee, the anatomical conformation of the hip is such that the US beam cannot reach a large portion of femur and acetabulum profile because of their position inside the joint and the thickness of subcutaneous tissue and muscle mass. It is possible to see only a limited portion of articular bone and this can undoubtedly lead to bone erosions being missed in certain 'hidden' regions of the joint (8). It would be interesting to evaluate the hip joint in PsA patients by MRI and CT scans in order to clarify the prevalence of erosions in PsA.

In our study osteophytes were imaged in 27 joints (20%). An associated osteoarthritis could partially explain the frequency of osteophytes we found. However, when we compare the features of patients who had osteophytes with patients with no osteophytes at US examination, no statistically significant differences were found in mean age, disease duration and in BASDAI score, even if a trend to significance was given for the latter.

We can hypothesise that damage of articular structures due to inflammation or abnormal posture (for instance, for axial or lower limb involvement) might favour the appearance of secondary osteoarthritis of the hip in PsA patients.

Our study is preliminary and has some limitations. We focused our attention on the prevalence of effusion and synovial hypertrophy but no data on signs of enthesitis are reported. Moreover, it would be interesting to evaluate possible differences in hip involvement in PsA subtypes, *i.e.* evaluate the frequency of hip arthropathy in the axial type. Unfortunately, the limited number of patients enrolled and the small number of patients with axial involvement (only 12) does not allow such an analysis.

In conclusion, US is a useful imaging method to evaluate hip involvement in PsA which could be integrated into routine PsA management even if patients do not complain of hip symptoms. US should be used in patients complaining of hip pain, to properly distinguish PsA activity from the osteoarthritis thereby determining more appropriate treatment.

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